Claims

1. A method of redrawing a visual display of graphical data whereby a current display is replaced by an updated display, comprising, in response to a redraw request, immediately replacing the current display with a first approximate representation of the updated display, generating a final updated display, and replacing the approximate representation with the final updated display.

2. A method as claimed in claim 1, including replacing said first approximate representation with one or more successive improved approximate representations of the updated display before replacing the last displayed approximate representation with the final updated display.

3. A method as claimed in claim 1 or claim 2, wherein the replacement of the current display by said first and any subsequent approximate representations is performed in parallel with generating said final updated display.

4. A method as claimed in any preceding claim, wherein at least said first approximate representation comprises a scaled version of a reduced resolution bitmap representation of said updated display.

5. A method as claimed in Claim 4, wherein a subsequent improved approximate representation

comprises said scaled version of a reduced resolution bitmap representation of said updated display with vector outlines superimposed thereon.

6. A method of generating variable visual representations of graphical data, comprising dividing said graphical data into a plurality of bitmap tiles of fixed, predetermined size, storing said tiles in an indexed array and assembling a required visual representation of said graphical data from a selected set of said tiles.

7. A method as claimed in claim 6, wherein a current visual representation of said graphical data is updated by removing redundant tiles from said selected set and adding new tiles to said selected set.

8. A method as claimed in claim 6 or claim 7 wherein said array of tiles represents graphical data from multiple sources.

9. A method as claimed in claim 7, wherein said multiple sources include applications running on a data processing system and an operating system of said data processing system.

10. A method as claimed in any one of claims 6 to 9, including processing subsets of said tiles in parallel.

11. A method as claimed in any of claims 1 to 5 wherein said visual displays are assembled from tiles in accordance with any of claims 6 to 10.

12. A method of processing a digital document, said document comprising a plurality of graphical objects arranged on at least one page, comprising dividing said document into a plurality of zones and, for each zone, generating a list of objects contained within and overlapping said zone.

13. A method as claimed in claim 12, wherein a visual representation of part of said document is generated by determining which of said zones intersect said part of said document, determining a set of said objects associated with said zones which intersect said part of said document and processing said set of objects to generate said visual representation.

14. A method as claimed in claim 11 or claim 12, wherein visual representations of said document are generated by means of a method as claimed in any one of claims 6 to 10.

15. A method as claimed in claim 14, wherein each of said zones corresponds to at least one of said tiles.

16. A digital document processing system adapted to implement the method of any of claims 1 to 15.

17. A system as claimed in claim 16, comprising:

an input mechanism for receiving an input bytestream representing source data in one of a plurality of predetermined data formats;

an interpreting mechanism for interpreting said bytestream;

a converting mechanism for converting interpreted content from said bytestream into an internal representation data format; and

a processing mechanism for processing said internal representation data so as to generate output representation data adapted to drive an output device.

18. A system as claimed in Claim 17, wherein said source data defines the content and structure of a digital document, and wherein said internal representation data describes said structure in terms of generic objects defining a plurality of data types and parameters defining properties of specific instances of generic objects, separately from said content.

19. A system as claimed in Claim 18, further including a library of generic object types, said internal representation data being based on the content of said library.

20. A system as claimed in Claim 18 or Claim 19, including a parsing and rendering module adapted to generate an object and parameter based representation of a specific view of at least part

of said internal representation data, on the basis of a first control input to said parsing and rendering module.

21. A system as defined in Claim 20, further including a shape processing module adapted to receive said object and parameter based representation of said specific view from said parsing and rendering module and to convert said object and parameter based representation into an output data format suitable for driving a particular output device.

22. A system as claimed in Claim 21, wherein said shape processing module processes said objects on the basis of a boundary box defining the boundary of an object, a shape defining the actual shape of the object bounded by the boundary box, the data content of the object and the transparency of the object.

23. A system as claimed in Claim 22, wherein said shape processing module is adapted to apply grey-scale anti-aliasing to the edges of said objects.

24. A system as claimed in Claim 21, Claim 22 or Claim 23, wherein said shape processing module has a pipeline architecture.

25. A system as claimed in any one of Claims 18 to 24, wherein said object parameters include dimensional, physical and temporal parameters.

26. A system as claimed in any of Claims 17 to 25, wherein the system employs a chrominance/luminance-based colour model to describe colour data.

27. A system as claimed in any of Claims 17 to 26, wherein the system is adapted for multiple parallel implementation in whole or in part for processing one or more sets of source data from one or more data sources and for generating one or more sets of output representation data.

28. A graphical user interface for a data processing system in which interactive visual displays employed by the user interface are generated by means of a digital document processing system as claimed in any one of Claims 16 to 27.

29. A data processing device incorporating a graphical user interface as claimed in Claim 28.

30. A hardware device for data processing and/or storage encoding a digital document processing system as claimed in any one of Claims 16 to 27.

31. A hardware device as claimed in Claim 30, further including a core processor system.

32. A hardware device as claimed in Claim 31, wherein said core processor is a RISC processor.

33. A data processing system including a digital document processing system as claimed in any one of Claims 16 to 27.

34. A data processing system as claimed in Claim 33, wherein said data processing system comprises a portable data processing device.

35. A data processing system as claimed in Claim 34, wherein said portable data processing device comprises a wireless telecommunications device.

36. A data processing system as claimed in Claim 33, wherein said data processing system comprises a network user-terminal.

37. A peripheral device for use with a data processing system, including a digital document processing system as claimed in any one of Claims 16 to 27.

38. A peripheral device as claimed in Claim 37, wherein said peripheral device is a visual display device.

39. A peripheral device as claimed in Claim 37, wherein said peripheral device is a hardcopy output device.

40. A peripheral device as claimed in Claim 37, wherein said peripheral device is an input device.

41. A peripheral device as claimed in Claim 37, wherein said peripheral device is a network device.

42. A peripheral device as claimed in Claim 37, wherein said peripheral device is a multi-function peripheral device.